

We claim:

1. A Z-axis assembly for an optical inspection apparatus, comprising:

a) a base;

5 b) first and second rails secured to said base, said first and second rails being parallel to each other;

c) a plurality of carriages supported by ball bearings for translatory movement parallel to the Z-axis on each of said first and second rails, said carriages having a line of travel 10 through said ball bearings in contact with their respective rails;

d) a support structure secured to said carriages;

15 e) a lens assembly secured to said support structure such to be movable parallel to the Z-axis, said lens assembly including an optical axis parallel to the Z-axis and said lines of travel, said optical axis and said lines of travel lie on a common plane.

2. A Z-axis assembly as in claim 1, wherein:

20 a) said base is U-shaped in cross-section including first and second upright walls; and

b) said first and second rails are secured to respective first and second upright walls.

25 3. A Z-axis assembly as in claim 1, wherein said first and second rails include opposed longitudinal grooves along which said ball bearings travel.

4. A Z-axis assembly as in claim 1, wherein said carriages are U-shaped in cross-section.

5. A Z-axis assembly as in claim 1, wherein:

- a) said support structure is a box structure; and
- b) said lens assembly is disposed within said box structure.

10 6. A Z-axis assembly as in claim 5, wherein said box structure includes a front structure, a rear plate and first and second side members joined to said front structure and said rear plate.

7. A Z-axis assembly as in claim 6, wherein said front structure is joined to said carriages.

8. A Z-axis assembly as in claim 6, wherein said front structure is substantially open and cross-ribbed.

15 9. A Z-axis assembly as in claim 5, wherein said box structure is open at the bottom.

10. A Z-axis assembly as in claim 5, wherein said rear plate and said first and second side members form a U-shaped cross-section.

20 11. A Z-axis assembly as in claim 5, wherein said rear plate includes a bottom portion extending beyond a bottom portion of said front structure.

12. A Z-axis assembly as in claim 1, wherein said optical axis lie centrally between said line of travel of said  
25 carriages.

13. A Z-axis assembly for an optical inspection apparatus,  
comprising:

- a) a base;
- b) first and second rails secured to said base, said  
5 first and second rails being parallel to each other;
- c) a plurality of carriages supported by ball bearing  
for translatory movement parallel to the Z-axis on each of said  
first and second rails, said carriages having a line of travel  
through said ball bearings in contact with their respective  
10 rails;
- d) a box structure support secured to said carriages;
- e) said box structure support including a front  
structure, a rear plate and first and second side members joined  
to said front structure;
- 15 f) said rear plate providing a platform for supporting  
a component of the optical inspection system.

14. A Z-axis assembly as in claim 13, and further  
comprising a lens assembly secured to said rear plate, said lens  
assembly including an optical axis parallel to the Z-axis and  
20 said lines of travel, said optical axis and said lines of travel  
substantially lying on a common plane.

15. A Z-axis assembly as in claim 13, wherein said optical  
axis lie centrally between said line of travel of said  
carriages.

16. A Z-axis assembly as in claim 13, wherein said rear plate includes a bottom portion extending beyond a bottom portion of said front structure.